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# Sustainability of Small Farm Holders in Indian Coffee Sector

**A. N. Vijayakumar*, K. Shilpa****

**Abstract**

India's coffee sector has been facing challenges of price volatility and climate change. Karnataka being the leading producer grapples with market fluctuations and escalating labour costs. Small-scale farmers contributing up to 70% of production, deal with price fluctuations and limited bargaining power. Sustainable farming practices offer environmental stewardship and economic resilience. However, balancing short-term gains with long-term market maturity is crucial. The study emphasises on the need for capacity-building, organic cultivation promotion, and certification awareness to bolster farm incomes. Strategies such as multi-cropping and enhanced production methods are recommended to ensure financial security and sustainability. Karnataka's central role highlights the need for resilient agricultural practices amidst market uncertainties. Direct engagement with buyers and understanding global demand dynamics are identified as crucial for smallholder success. Overall, this research provides insights into supporting India's coffee smallholders and outlines pathways for future studies to enhance their resilience and profitability in a dynamic market environment.

**Keywords:** Coffee Sector, Price Volatility, Sustainable Farming Practices, Small-Scale Farmers

**JEL Classification:** Q13, Q18, L66.2

## INTRODUCTION

Coffee is an important exportable commodity amongst Indian plantation commodities with highest exports. India is the sixth-largest producer and seventh-largest exporter of this commodity with Brazil, Vietnam, Columbia, Indonesia and Ethiopia. The country produces coffee varieties of both Arabica and Robusta. Coffee cultivation is mainly concentrated to the states of south India namely Karnataka, Kerala and Tamil Nadu. These states considered to be traditional coffee tracts of India collectively contributing more than 90% of the country's coffee production. In 2021-22, India's domestic coffee consumption was estimated at around 150000 tonnes, reflecting an increase from 140000 tonnes (Coffee statistics, 2023).

In recent years, India contributed 319500 MT to the total global production of coffee, which is considered to be of high quality. In 2022, the state of Karnataka contributed approximately 70% of the country's total coffee production, and the state exported over 55% by harvesting around 3.33 lakh tons of Arabica beans. The primary coffee-producing regions in Karnataka are Kodagu, Chikmagalur and Hassan. Arabica dominates both the area and production in North Kodagu, whereas South Kodagu predominantly cultivates Robusta. In Chikkamagaluru and Sakaleshpura areas the coffee variety of Arabica coffee is primarily grown. A mixture of price fluctuations and unfavourable climatic conditions resulted in the production & marketing of coffee. Producers experienced many problems with the coffee in the early years. Changes in the international market prices and an increase in the labour cost as well as the downfall of prices have also affected coffee producers. The other issues affecting coffee marketing in Karnataka are, rapidly shifting consumer tastes and preferences, economic uncertainty and weakening international terms of trade, distribution channels that drain farmers' wallets, and the size of marketing expenses.

Small-scale farmers of Indian coffee sector contribute around 70 percent to the total output of the county. The coffee farm income is the primary source of income for around 25 million producers for their livelihoods

* Professor, Indian Institute of Plantation Management, Bengaluru, Karanataka, India. Email: v.kumariipmb@gmail.com
** Assistant Professor, Indian Institute of Plantation Management, Bengaluru, Karanataka, India.

(Caswell et al., 2021). However, the Indian coffee sector has been facing challenges with price volatility, global issues, climate change, limited access to finance, lack of infrastructure facilities, and limited access to land, labour, knowledge and technical resources. These challenges make it difficult for them to adopt technologies that could enhance yield and income from existing cultivated regions and also contribute to conflicts between national development goals of economic improvement for the rural poor and ecological conservation. Small coffee growers also suffer from market volatility and price fluctuation, lack of information and bargaining power.

Sustainable coffee development in India contributes to various aspects such as improving export, addressing the issue of climate change, and natural resource management. The sustainable growth of the Indian farm sector depends upon the overall performance of small and marginal farmers (Dwivedi et al., 2015). The issue of sustainable development relies on transforming patterns of production, consumption and social behaviour. Sustainable coffee farming helps producers during the trade crisis by providing better prices. However, these prices may decrease in the long term as the market matures, hence, farmers need to improve productivity to maintain their income (Jones, Connie, et al., 2006). Sustainable farming practices also focus on water management and energy efficiency, minimising the negative impact on the surrounding ecosystem. Farmers need to recognise the detrimental effects of artificial agricultural methods on the environment and make efforts to avoid them. Embracing organic farming methods is crucial as they promote sustainability in the agricultural sector, benefiting both the environment and the economy (Mariappan & Zhou, 2019). The sustainable practices to coffee farmers not only improve the quality and yield of their crops but also reduce their dependence on harmful chemicals and synthetic inputs. The approach promotes the use of organic fertilisers, pest control methods and soil management techniques that enhance soil health and biodiversity. Soil fertilities and organic matter are enhanced by minimising run-off and surface temperature, while also improving soil moisture and increasing the availability of essential plant nutrients (Kassie et al., 2015). It is, therefore, adapting to sustainable practices in farming is important for increasing the farm income. This study, therefore, explored existing literature focusing on sustainability, augmenting farm income strategies in the scholastic literature from the reputed research database.

## REVIEW OF LITERATURE

This study referred to research articles indexed in Scopus, web of Science, and ABDC journals to understand existing research on sustainability practices in agri-plantation sector. The review focused on strategies for augmenting the farm income of small farm holders in commodities in general and the coffee sector in particular. The existing research on various dimensions of sustainable development focusing on coffee production, marketing, and trade chain impacting to enhance farm income has been reviewed.

The study of Borrella et al. (2015), focusing on shifting from regular coffee to specialty and sustainable coffee in the global markets, emphasised on the importance of connecting smallholder farmers with coffee roasters. This would lead to better access to higher value for their harvest and more economic opportunities for farmers. Abdallah et al. (2021) studied that sustainable agricultural practices can boost farm income and food security for rural households. Policymakers and stakeholders can support this by promoting sustainable practices. This study highlighted the impact of adopting these practices and emphasised on the necessity for comprehensive approach to sustainable agriculture. Kilian et al. (2006) focused on mitigating the impact of low coffee prices. They suggested that producers can use sustainable coffee production and certification as a strategy to differentiate their products in the market and reduce production costs by shifting away from input-intensive techniques. Ponnusamy and Devi, (2017) explored an integrated farming system to improve farmers' income and sustainable livelihoods. This study examined the financial benefits, socioeconomic factors and changing preferences. The finds integration of livestock into farming systems can increase income and have positive social and ecological outcomes. Samper and Quiñones-Ruiz (2017) studied how coffee production and consumption are of interest to many stakeholders, including NGOs and governments due to their global reach. The coffee sector has been an early adopter of sustainability standards and continues to lead in sustainability initiatives for other agricultural sectors.

The benefits of sustainability development for coffee farm holders are abundant. Firstly, adopting sustainable practices can lead to increased productivity and profitability in the long run. By prioritising soil health and biodiversity, farmers can improve the resilience of their crops, reduce the risk of pests and diseases, and ultimately achieve higher yields. Van Hille et al. (2020) explored the role of non-profit organisations in motivating businesses to source with sustainable certification and cross-sector partnerships. Kapinga (2021) focuses on capturing the dynamics of changes and transformations in production as well as marketing of coffee. The study concluded the limitations of agricultural marketing cooperative societies for promoting sustainable development. Setsoafia et al. (2022) examined the impacts of sustainable agriculture practice adoption on farm income and food security. This study emphasised on the importance of encouraging farmers to adopt sustainable agriculture practices as a comprehensive package to increase farm income and ensure food security. Howard and Jaffee (2013) found trends and dynamics of sustainability marketing, focusing on the involvement of smaller, mission-driven firms and larger profit-driven firms. The study aimed to analyse the strategies of firms with traditional dichotomy.

The Indian coffee sector has adopted various sustainable practices that involve implementing many farm business strategies. Adapting to the organic farming method, the use of synthetic pesticides and fertilisers can be reduced, which helps to maintain soil health and biodiversity. Rich et al. (2018) examined to assess the awareness and perceptions of certified coffee and environmental conservation among coffee farms of India. The study emphasised coffee planters associations with the environment amongst certified and organic producers. However, the price premium for certified and organic coffee is relatively small, indicating the limited potential for conservation-oriented certification beyond the niche market. Velmourougane and Bhat (2017) focused on the sustainability challenges faced by various stakeholders in the coffee production chain, with a particular emphasis on India. India is highlighted as one of the coffee-producing and exporting countries in the world. The study also emphasised on the importance of coffee cultivation in ecosystem conservation and the role of government in supporting coffee farmers.

Sustainable development focuses on the conditions and problems faced by coffee farmers and the techniques they employ to overcome these problems. Barjolle et al. (2017) focused on the importance of geographical indications in the coffee sector and their role in rationalising the state's involvement. The study provided insights into the approaches taken by Colombia and Kenya and emphasised on the significance of empowering producers in the sector. Rosyani et al. (2021) recommended the introduction of new regulations that encourage companies to empower farmers in implementing the Indonesian sustainable palm oil principles. Furthermore, the study proposed for introduction of rewards for farmers who successfully implemented the Indonesian sustainable palm oil principles, allowing them to receive a premium price. Ogawa et al. (2023) perceived the need for a balanced approach to upland farming that considers economic, environmental and social aspects of sustainability. The study emphasised on the role of policy in encouraging farms to adopt practices that achieve these dimensions of sustainability and highlights the importance of stakeholder management in achieving sustainable outcomes. Kudama et al. (2021) analysed sustainable coffee farm practices, such as pruning, stumping and fertiliser use. As a result, the yields obtained by these farmers are relatively low. Kassie et al. (2015) analysed smallholder farmers' adoption decisions of multiple sustainable intensification practices. Factors influencing sustainable intensification practice adoption include social capital, extension services, government support, pests and diseases and market access. The findings provided insights for encouraging greater sustainability intensification practice adoption. Malyadri (2016) mentioned that coffee cultivation in India takes place under a two-tier mixed-shade canopy, consisting of evergreen leguminous trees. These shade trees benefit in preventing soil erosion, enriching the soil, protecting coffee plants from temperature fluctuations and supporting diverse flora and fauna. Additionally, coffee plantations in India also grow other crops like spices and fruits alongside coffee plants. Meert et al. (2005) discussed the sustainability in marginal farms and highlighted various survival strategies closely embedded within the household structure of typical family farms. The review found opportunities provided by different forms of diversification. Jouzi et al. (2017) studied

the opportunities and challenges of small-scale farmers in developing countries, with a specific emphasis on organic farming. The study aimed to investigate how organic farming can food policy-makers regarding food production for a growing population. Murindahabi et al. (2019) highlighted the significance of coffee exports in driving long-term economic growth in coffee exporting countries.

The aforementioned scholastic reviews focus on the promotion of sustainable practices of small farm holders such as pruning, stumping, and fertiliser use (Abdallah et al., 2021; Setsoafia et al., 2022; Velmourougane & Bhat, 2017; Kudama et al., 2021; Kassie et al., 2015) low price of coffee (Kilian et al., 2006), challenges in marketing of their harvest (Howard & Jaffee, 2013), improper information about the integrated farming system (Ponnusamy & Devi, 2017), dynamic changes of marketing (Kapinga, 2021), awareness and perception of certified coffee (Rich et al., 2018), economic aspects (Ogawa et al., 2023; Murindahabi et al., 2019). However, the research on sustainability in Indian coffee sector found to be limited and especially focusing on sustainability amongst small farm holders of coffee are scarce. This dearth of scholastic knowledge motivated author to explore sustainable strategies to augment farm income of small farm holders in coffee sector. This study, therefore, intends to understand challenges of small-scale farmers in Indian coffee sector and their perceptions on sustainable practices to enhance farm income. This research aims to investigate effective strategies for enhancing the farm income of coffee farmers. The outcomes of this study shall facilitate coffee farm holders to understand various sustainable practices to enhance farm income and also assists policy makers to evolve suitable interventions to strengthen Indian coffee sector by promoting sustainable farming practices.

## RESEARCH METHODOLOGY

This research with descriptive and exploratory methods used stratified random sampling for data collection. The primary data has been collected by survey method with a structured questionnaires from coffee growers as primary respondents in Karnataka state. The secondary sources of data from available public domain were also part of the study. The study with a known population of small-scale coffee farmers in the state of Karnataka at 95% confidence interval and a 5% margin of error used the following formula to ascertain sample size (n).

$n = Z^2\ p\ (1-p) / (E^2)$

Where:

n is the required sample size,

Z is the Z-score corresponding to the chosen confidence level,

P is the estimated proportion of the population,

E is the margin of error.

The sample size (n) of 383 was determined and correlated with four primary coffee-producing regions, aligning with the concentration of small farm holders. This information is sourced from secondary data provided by the Coffee Board India, as illustrated in the Table 1.

**Table 1: Sample Size**

| *Sr. No.* | *Name of the Region* | *Population* | *Percentage* | *Sample Size* |
|---|---|---|---|---|
| 1 | Chikkamagalur | 21203 | 27 | 104 |
| 2 | Hassan | 22043 | 28 | 101 |
| 3 | Madikeri | 13854 | 18 | 69 |
| 4 | Virajpet | 20513 | 27 | 109 |
| | Total | 77613 | 100 | 383 |

The study used descriptive statistics and percentages to explain generated statistical tables based on survey research outcomes.

## ANALYSIS AND INTERPRETATION OF DATA

This study focusing on intended objectives analysed and interpreted in the following paragraphs.

**Table 2: Challenges of Small Farm Holders of Coffee (n=383)**

| *Sr. No.* | *Challenges* | *Respondents* | *Percentage* | *Mean* | *Stdvn* |
|---|---|---|---|---|---|
| 1 | Limited market access for coffee | 337 | 88 | 3.68 | 1.23 |
| 2 | Fluctuating coffee prices | 337 | 88 | 4.09 | 1.24 |
| 3 | Access to Finance | 351 | 92 | 3.99 | 0.63 |
| 4 | Climatic Changes | 352 | 92 | 4.10 | 1.42 |

Source: Primary data.

The Table 2 reveals small farm holders' challenges across multiple dimensions. Limited market access affects 88% of respondents, with moderate perceived severity (mean=3.68) and some variability in responses (Sdv=1.23). Fluctuating coffee prices and climatic changes stand out as pervasive challenges, acknowledged by 88% and 92% of farmers, respectively. These challenges are notably severe, with mean scores of 4.09 and 4.10, and exhibit varying levels of perception among respondents (Sdv=1.24 for prices, Sdv=1.42 for climate). Access to finance is another prevalent concern for 92% of farmers, with moderately high perceived difficulty (mean=3.99) and lower variability in responses (Sdv=0.63). These findings underscore the complex and interrelated challenges faced by small coffee farm holders, emphasising the need for targeted interventions to address market access, price volatility, climatic impacts and financial constraints to ensure the sustainability and resilience of the coffee sector at the grassroots level.

**Table 3: Sustainable Practices of Small Farm Holders of Coffee (n=383)**

| *Sr. No.* | *Sustainable Practices* | *Respondents* | *%* | *Mean* | *Std* |
|---|---|---|---|---|---|
| 1 | Organic farming | 128 | 33 | 2.0 | 0.0 |
| 2 | Sustainable Value addition process | 134 | 35 | 2.0 | 0.0 |
| 3 | Agroforestry with integrated shade trees | 383 | 100 | 1.0 | 0.0 |
| 4 | Water conservation practice | 360 | 94 | 1.0 | 0.0 |
| 5 | Soil conservation | 364 | 95 | 1.0 | 0.0 |
| 6 | Biodiversity preservation | 245 | 64 | 1.5 | 0.5 |
| 7 | Waste management | 207 | 54 | 1.5 | 0.5 |
| 8 | Community engagement | 352 | 92 | 1.0 | 0.0 |
| 9 | Certification for ethical and sustainable farming | 169 | 44 | 2.01 | 1.09 |

Source: Primary data.

The Table 3 sheds light on the adoption of sustainable practices among small farm holders in the coffee sector. The data indicates a widespread commitment to certain sustainable practices, as evidenced by the unanimous 100% adoption of agroforestry with integrated shade trees, water conservation practices, soil conservation and community engagement. These practices, each with a mean score of 1.0 and a standard deviation of 0.0, underscore a unanimous and standardised implementation within the surveyed group. Additionally, organic farming and sustainable value-addition processes are embraced by 33% and 35% of respondents, respectively, with mean scores of 2.0 and no observed deviation, reflecting a moderate level of adoption. Biodiversity preservation and waste management practices are reported by 64% and 54% of respondents, with mean scores of 1.5 and small standard deviations of 0.5. The certification for ethical and sustainable farming, reported by 44% of respondents, demonstrates a somewhat varied adoption level with a mean score of 2.01 and a standard deviation of 1.09. Overall, the data suggests a commendable commitment to various sustainable practices among small coffee farm holders, with potential opportunities for further encouragement and standardisation in specific areas such as organic farming and sustainable value-addition processes.

**Table 4: Coffee Market Dynamics on Enhancing Coffee Farm Income (n=383)**

| Sr. No. | Market Dynamics | Respondents | % | Mean | Std |
|---|---|---|---|---|---|
| 1 | Fluctuating coffee prices | 349 | 91 | 4.09 | 1.02 |
| 2 | Access to direct buyers | 356 | 93 | 3.68 | 1.03 |
| 3 | Global demand trends | 329 | 86 | 3.92 | 1.18 |
| 4 | Changing Consumer preferences/trends | 337 | 88 | 3.34 | 0.95 |

Source: Primary data.

The above Table 3 shows the results of a survey of coffee farmers about the most important market dynamics affecting their income. The farmers were asked to rate the importance of four factors on a scale of 1-5, with 5 being the most important. Accordingly, the analysed data from the above table, reveals that the fluctuating coffee prices were the most important factor, with an average rating of 4.09. This suggests that coffee farmers are most concerned about the volatility of coffee prices, which can make it difficult to plan for the future. Access to direct buyers was the second most important factor, with an average rating of 3.68. This suggests that coffee farmers would like to be able to sell their coffee directly to buyers, rather than going through intermediaries. Global demand trends were the third most important factor, with an average rating of 3.92. This suggests that coffee farmers are aware of the importance of global demand for coffee, and they are concerned about the impact of any changes in demand on their income. Changing consumer preferences/trends was the least important factor, with an average rating of 3.34. This suggests that coffee farmers are less concerned about changes in consumer preferences, such as the growing popularity of specialty coffee than they are about other factors. The results from Table 3 display the outcomes of a survey conducted among coffee farmers to gauge the primary market dynamics influencing their income. Respondents were requested to assess the significance of four factors using a scale ranging from 1-5, where 5 denotes the highest importance. Upon scrutinising the data provided in the aforementioned table, it is evident that fluctuating coffee prices emerged as the foremost concern, receiving an average rating of 4.09. This underscores the heightened apprehension among coffee farmers regarding the unpredictable nature of coffee prices, posing challenges for future planning. Following closely, access to direct buyers ranked as the second most pivotal factor, earning an average rating of 3.68. This indicates a strong preference among coffee farmers for selling their produce directly to buyers rather than relying on intermediaries. Global demand trends secured the third position in terms of importance, garnering an average rating of 3.92. This implies that coffee farmers recognise the critical role of global demand in shaping their fortunes and express apprehension about the potential impact of demand fluctuations on their income. Conversely, changing consumer preferences and trends emerged as the least significant factor, with an average rating of 3.34. This suggests that coffee farmers exhibit relatively lower concern regarding shifts in consumer preferences, such as the rising popularity of specialty coffee, in comparison to other influencing factors.

**Table 5: Strategies for Enhancing Income of Small Farm Holders' Coffee (n=383)**

| Sr. No. | Strategies | Respondents | % | Mean | Std |
|---|---|---|---|---|---|
| 1 | Reducing reliance on chemical inputs and adopting organic methods, not only improves the quality of coffee but also gains access to the premium market and boosts farmer's income. | 333 | 87 | 3.29 | 1.04 |
| 2 | Collaborating with other small-scale farmers to invest in shared resources shall reduce individual costs and increase overall efficiency and impact in augmenting farm income. | 322 | 84 | 3.42 | 1.11 |
| 3 | Multi-cropping and multi-level cropping with coffee farms shall ensure a stable income. | 368 | 96 | 4.09 | 1.1 |

| *Sr. No.* | *Strategies* | *Respondents* | *%* | *Mean* | *Std* |
|---|---|---|---|---|---|
| 4 | Farmers cooperatives shall positively impact sustaining collective bargaining power leading to increased price realization and sustainability. | 352 | 92 | 3.44 | 0.86 |
| 5 | Promote value-addition, specialty coffee processing to the coffee commodity. | 352 | 92 | 3.76 | 1.01 |
| 6 | Improve access to market information that helps farmers for decisions about when and where to sell their coffee. This can empower farmers for bargaining remunerative prices and explore new markets. | 322 | 84 | 3.92 | 1.18 |
| 7 | Educate farmers on climate-resilient farming practices to help farmers adapt to changing weather patterns. | 337 | 88 | 3.84 | 1.14 |
| 8 | Promote eco-tourism on coffee farms. | 368 | 96 | 4.32 | 0.51 |

Source: Primary data.

Table 4, highlights several key strategies for enhancing the income of coffee smallholders. The most emphasised on strategy, chosen by 87% of respondents, is reducing reliance on chemical inputs and adopting organic practices. This practice leads to cost savings for farmers, as they spend less on fertilisers and pesticides. Additionally, organic coffee often fetches higher prices in the market, further boosting farmer income. Another important strategy, mentioned by 84% of respondents, is collaboration among small-scale farmers. This approach of collectivising small farm holders facilitate to share resources, knowledge and strengthen bargaining power. This can assist to enhance the production practices, influence for better prices to the coffee and access markets that would be out of reach for individual farmers. Further, the study also highlights other promising strategies, such as multi-cropping and value-addition processing. Multi-cropping can improve farm resilience and income by diversifying crops and providing additional revenue streams. Value-addition processes, such as roasting and branding, can capture a higher share of the final coffee price for farmers.

## FINDINGS AND SUGGESTIONS

This study with intended objectives finds that, small scale coffee farm holders have few constraints to enhance farm income. The small-scale farmers in the study have been growing coffee under the shade trees by adopting water and soil conservation practice by engaging local community. However, the practice of organic coffee cultivation and sustainable value addition process amongst the small farm holders in the state of Karnataka need to be promoted through capacity building programs. In addition, the certification for farming practices also needs to be encouraged through awareness programs. The market dynamics with fluctuating coffee prices and lack of access to direct buyers are influencing small scale coffee farmers income. The research additionally revealed that coffee producers' express apprehension about variables beyond their control, such as fluctuations in coffee prices and the dynamics of global demand. They would like to be able to sell their coffee directly to buyers, and they are aware of the importance of global demand trends. However, they are less concerned about changes in consumer preferences. The study suggests strategies of promoting multi-cropping, multi-level cropping, coffee farmers' collectives, the practice of reducing costs, improving production practices, and accessing higher-value markets etc., shall facilitate smallholders to achieve greater financial security and sustainability.

## CONCLUSION

India is a significant player in the global coffee market, with Karnataka being a pivotal contributor to both production and exports. Challenges faced by small-scale farmers, including price volatility and limited resources, necessitate sustainable practices for long-term viability. The study highlighted the importance of promoting organic cultivation, sustainable value addition, and awareness programs for certifications. While acknowledging market dynamics and concerns over global demand fluctuations, the research underscores the need for direct buyer access. Strategies such as multi-cropping and promotion of Coffee Producers Organisations are recommended to enhance financial security and sustainability for smallholders, emphasising the crucial role of adopting and promoting sustainable farming practices in increasing farm income. This study

provided valuable insights for identifying promising approaches to support coffee smallholders. The future studies may focus on impact of climate change, price discovery practices of coffee and its efficiency.

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## REFERENCES

Abdallah, A. H., Abdul-Rahaman, A., & Issahaku, G. (2021a). Sustainable agricultural practices, farm income and food security among rural households in Africa. *Environment, Development and Sustainability*, *23*(12), 17668-17701. doi:https://doi.org/10.1007/s10668-021-01407-y

Abdallah, A. H., Abdul-Rahaman, A., & Issahaku, G. (2021b). Sustainable agricultural practices, farm income and food security among rural households in Africa. In *Environment, Development and Sustainability* (vol. 23, no. 12). Springer Netherlands. doi:https://doi.org/10.1007/s10668-021-01407-y

Barjolle, D., Quiñones-Ruiz, X. F., Bagal, M., & Comoé, H. (2017). The role of the state for geographical indications of coffee: Case studies from Colombia and Kenya. *World Development*, *98*, 105-119. doi:https://doi.org/10.1016/j.worlddev.2016.12.006

Borrella, I., Mataix, C., & Carrasco-Gallego, R. (2015). *Smallholder farmers in the speciality coffee industry: Opportunities, constraints and the businesses that are making it possible*. doi:https://doi.org/10.1111/1759-5436.12142

Dwivedi, A., Dev, I., Kumar, V., Yadav, R., Yadav, M., Gupta, D., Singh, A., & Tomar, S. (2015). Potential role of maize-legume intercropping systems to improve soil fertility status under smallholder farming systems for sustainable agriculture in India. *International Journal of Life Sciences Biotechnology and Pharma Research*, *4*(3), 145.

Howard, P. H., & Jaffee, D. (2013). Tensions between firm size and sustainability goals: Fair trade coffee in the United States. *Sustainability (Switzerland)*, *5*(1), 72-89. doi:https://doi.org/10.3390/su5010072

Jouzi, Z., Azadi, H., Taheri, F., Zarafshani, K., Gebrehiwot, K., Van Passel, S., & Lebailly, P. (2017). Organic farming and small-scale farmers: Main opportunities and challenges. *Ecological Economics*, *132*, 144-154. doi:https://doi.org/10.1016/j.ecolecon.2016.10.016

Kapinga, O. (2021). *Cooperatives and sustainable development: The case of coffee marketing in the Matengo Highlands in Tanzania*. December.

Kassie, M., Teklewold, H., Jaleta, M., Marenya, P., & Erenstein, O. (2015). Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa. *Land Use Policy*, *42*, 400-411. doi:https://doi.org/10.1016/j.landusepol.2014.08.016

Kilian, B., Jones, C., Pratt, L., & Villalobos, A. (2006). Is sustainable agriculture a viable strategy to improve farm income in Central America? A case study on coffee. *Journal of Business Research*, *59*(3), 322-330. doi:https://doi.org/10.1016/j.jbusres.2005.09.015

Kudama, G., Wana, H., & Dangia, M. (2021). The adoption of bundled sustainable farm and environmental practices by coffee farmers in Southwest Ethiopia. *Scientific World Journal*, *2021*. doi:https://doi.org/10.1155/2021/9954230

Malyadri, P. (2016). Status of coffee plantation in India: A high time for innovation and sustainability towards make in India. *VSRD International Journal of Business and Management Research*, *47*(2), 2231-2248.

Mariappan, K., & Zhou, D. (2019). A threat of farmers' suicide and the opportunity in organic farming for sustainable agricultural development in India. *Sustainability (Switzerland)*, *11*(8). doi:https://doi.org/10.3390/su11082400

Meert, H., Van Huylenbroeck, G., Vernimmen, T., Bourgeois, M., & van Hecke, E. (2005). Farm household survival strategies and diversification on marginal farms. *Journal of Rural Studies*, *21*(1), 81-97. doi:https://doi.org/10.1016/j.jrurstud.2004.08.007

Murindahabi, T., Li, Q., Nisingizwe, E., & Ekanayake, E. M. B. P. (2019). Do coffee exports have impact on long-term economic growth of countries? *Agricultural Economics (Czech Republic)*, *65*(8), 385-393. doi:https://doi.org/10.17221/283/2018-AGRICECON

Ogawa, K., Garrod, G., & Yagi, H. (2023). Sustainability strategies and stakeholder management for

upland farming. *Land Use Policy*, *131*(May), 106707. doi:https://doi.org/10.1016/j.landusepol.2023.106707

Ponnusamy, K., & Devi, M. K. (2017). Impact of integrated farming system approach on doubling farmers' income. *Agricultural Economics Research Review*, *30*(conf), 233. doi:https://doi.org/10.5958/0974-0279.2017.00037.4

Rich, K. M., Chengappa, P. G., Muniyappa, A., Yadava, C. G., Manjyapura, G. S., Pradeepa Babu, B. N., Shubha, Y. C., & Rich, M. (2018). Coffee certification in India: Awareness, practices, and sustainability perception of growers. *Agroecology and Sustainable Food Systems*, *42*(4), 448-474. doi:https://doi.org/10.1080/21683565.2017.1361497

Rosyani, Edison, Ulma, R., & Aziz, M. (2021). Study of sustainability status of the implementation of ISPO (Indonesian Sustainable Palm Oil) in plasma farmers oil palm plantation. *IOP Conference Series: Earth and Environmental Science*, *716*(1). doi:https://doi.org/10.1088/1755-1315/716/1/012114

Samper, L. F., & Quiñones-Ruiz, X. F. (2017). Towards a balanced sustainability vision for the coffee industry. *Resources*, *6*(2), 1-28. doi:https://doi.org/10.3390/resources6020017

Setsoafia, E. D., Ma, W., & Renwick, A. (2022). Effects of sustainable agricultural practices on farm income and food security in northern Ghana. *Agricultural and Food Economics*, *10*(1). doi:https://doi.org/10.1186/s40100-022-00216-9

van Hille, I., de Bakker, F. G. A., Ferguson, J. E., & Groenewegen, P. (2020). Cross-sector partnerships for sustainability: How mission-driven conveners drive change in national coffee platforms. *Sustainability (Switzerland)*, *12*(7). doi:https://doi.org/10.3390/su12072846

Velmourougane, K., & Bhat, R. (2017). Sustainability challenges in the coffee plantation sector. *Sustainability Challenges in the Agrofood Sector*, 616-642. doi:https://doi.org/10.1002/9781119072737.ch26